

Application No.09/874,167

### REMARKS

Claims 1-42 are pending herein. By the Office Action and the Advisory Action, Claims 1-42 are rejected under 35 U.S.C. §102(e). In the Advisory Action, the examiner questioned the definiteness of several terms in Claims 1, 9, 21, 33, and 34. By this Amendment, Claims 1, 9, 21, 33, and 34 are amended. Claim 42 is canceled and Claim 43 is added. No new matter is added.

#### Rejection Under 35 USC §102(e)

The amendment to Claims 1, 9, 21, 33, and 34 is a broadening amendment submitted to more fully claim that which is Applicants' invention, and is not intended to limit or narrow the scope of the claims or to effect the Doctrine of Equivalents as it might be applied to the claims, were they unamended.

Claims 1-42 are rejected under 35 U.S.C. §102(e) as being anticipated by Black (U.S. Pat. No. 6,269,351). Applicants respectfully traverse the rejection.

Applicants believe that the claims as amended hereby patentably distinguish over the cited art in its capability for handling problems which are non-input-output mapping problems, in its use of complexity aware models, in the use of problem complexity related bound computations, in adjusting the problem complexity by changing the problem rather than the algorithm, and finally in adjusting the computation resources based on problem complexity. Specifically, Claims 1, 9, 21, 33, and 34 amended to more clearly set forth the functionality of the complexity module and the adaptation process, which permits problem modification to address solution requirements of optimization problems which are intrinsically difficult to solve.

Black attempts to solve a *fixed* quite limited problem, namely to generate a neural network that takes training set inputs and generates training set outputs with the least error. In its most general application, it is to learn a mapping from known inputs to known outputs. Black then focuses on solving this *fixed* problem as efficiently as possible. Solutions to this fixed mapping problem include adjusting the learning rate, changing the number of nodes in the neural net model, or generating new starting points.

Unfortunately, it is now known that there are optimization problems which are intrinsically difficult to solve. These optimization problems take, on average, an

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unacceptably long time to solve regardless of the algorithm, its efficiency at going from a starting point to new minima, or algorithm adjustments. Every parameter or algorithm that Black chooses to implement will not result in average rates of improvements that exceed a certain bound for these problems. Moreover, the rate of improvement for new optima will, on average, never exceed a limiting rate. Finally, it is also known that problems that seem very similar with the same optimization function, similar numbers of variables, and similar numbers of constraints can have quite different optimization difficulties. These intrinsically difficult optimization problems must be recognized quickly and dealt with. To handle these problems, there are four choices:

1. Give up and return an error,
2. Accept the best result possible given fixed computational resources,
3. Add computational resources of memory, clock cycles, processors, and
4. Change the problem to one that is easier to solve.

The subject application teaches (a) identification of such intrinsically difficult problems (Claim 1, comparing expected and actual solver behavior), (b) estimation of the fundamental average rate of improvement vs. computation tradeoff (Claim 1, adaptation), and (c) selecting one of the four choices above, including changing the problem to a similar but intrinsically easier problem (Claim 1, adaptation). Black does not anticipate that there are intrinsically difficult problems so the algorithm always attempts to adjust the algorithm. Black assumes that a poor rate of improvement is a problem of the algorithm. Finally, Black never adjusts the optimization problem itself, and does not anticipate the complexity module taught herein.

Black is directed toward a neural network. In Black's words, "The role of an ANN is to perform a non-parametric, nonlinear, multi-variate mapping from one set of variables to another. ANN 10 of FIG. 1 illustrates such a mapping by operating on input vector 12 to produce output vector 14. To perform this mapping, a training algorithm is applied to deduce the input/output relationship(s) from example data." (Black, column 1, lines 17-24). Black deals most generally with learning an input-output mapping.

In view of the foregoing, it is submitted that the cited prior art fails to teach all of the features of the Applicants' invention. Because the cited art does not teach all of the

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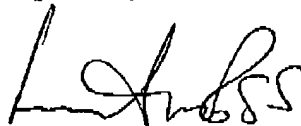
features taught by the specification and amended claims of the subject application, Applicants believe that the subject application is patentably distinguished from the cited art. Therefore, it is respectfully requested that the rejection of independent Claims 1, 9, 21, 33, and 34 be withdrawn. Because Claims 2-8, 10-20, 22-32, and 35-41 depend from now presumably allowable independent Claims 1, 9, 21, 33, and 34, it is respectfully request that the rejection of these claims also be withdrawn.

In view of the foregoing amendments and remarks, Applicants respectfully submit that the application is in condition for allowance. Favorable consideration and prompt allowance of the application are respectfully requested.

Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' Attorney, Linda M. Robb, at telephone number (310) 333-3683, El Segundo, California.

No additional fee is believed to be required for this amendment. However, the undersigned Xerox Corporation Attorney hereby authorizes the charging of any necessary fees, other than the issue fee, to Xerox Corporation Deposit Account No. 24-0025. This also constitutes a request for any needed extension of time and authorization to charge all fees therefor to Xerox Corporation Deposit Account No. 24-0025.

Respectfully submitted,



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